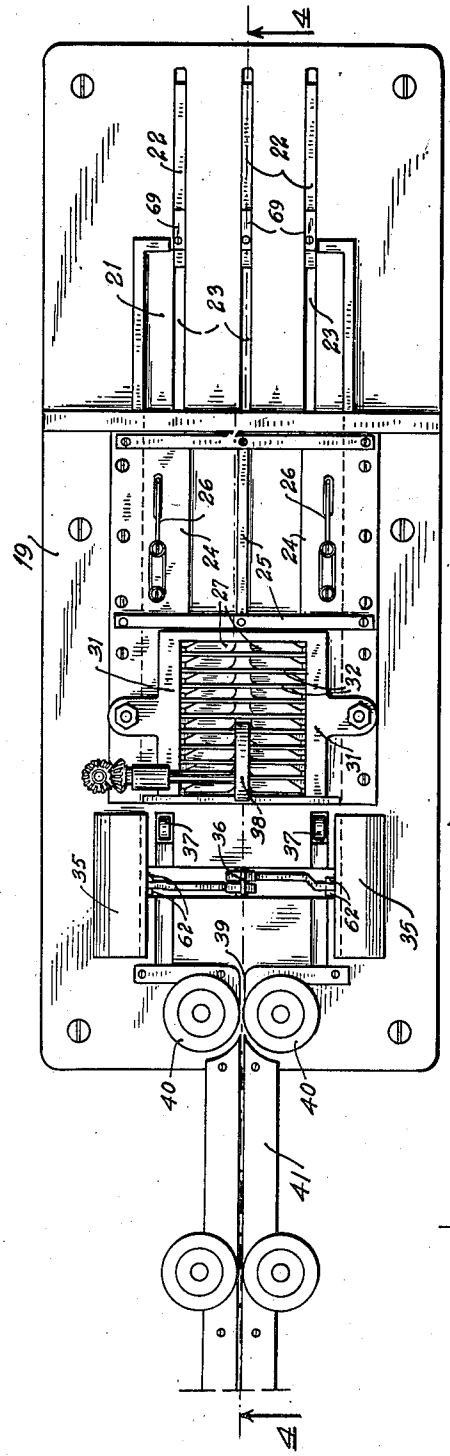
Dec. 28, 1943. I. A. DELINE 2,337,803

BOX PARTITION MACHINE

Filed Feb. 7, 1942 4 Sheets-Sheet 1



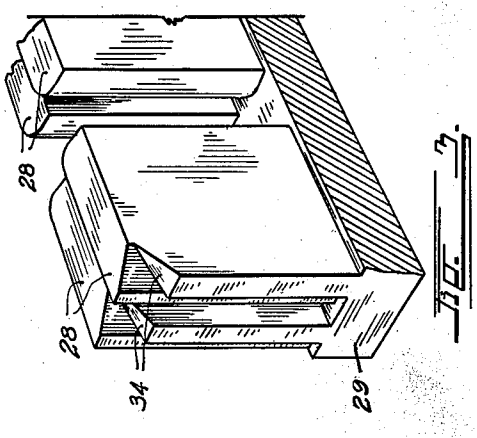


FIG. 3.

FIG. 1.

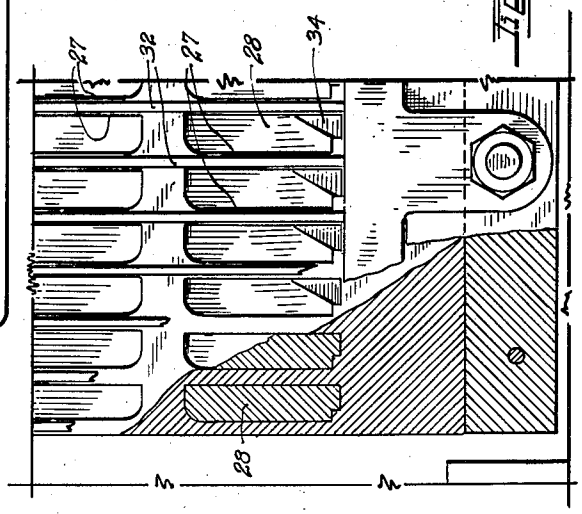


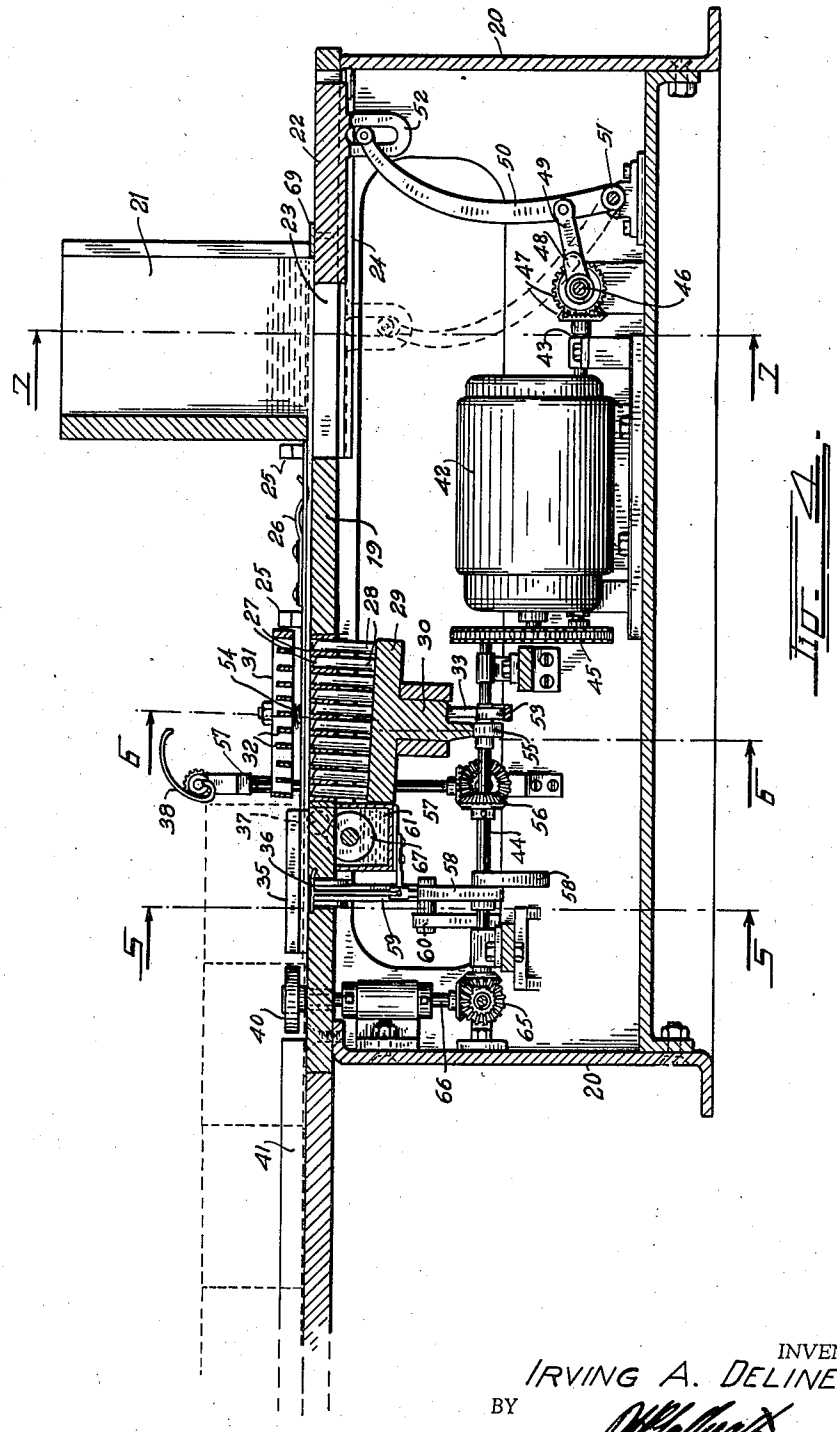
FIG. 2.

INVENTOR.
IRVING A. DELINE.
BY
ATTORNEY

Dec. 28, 1943. I. A. DELINE 2,337,803

BOX PARTITION MACHINE

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INVENTOR.
IRVING A. DELINE.
BY
ATTORNEY.

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BOX PARTITION MACHINE

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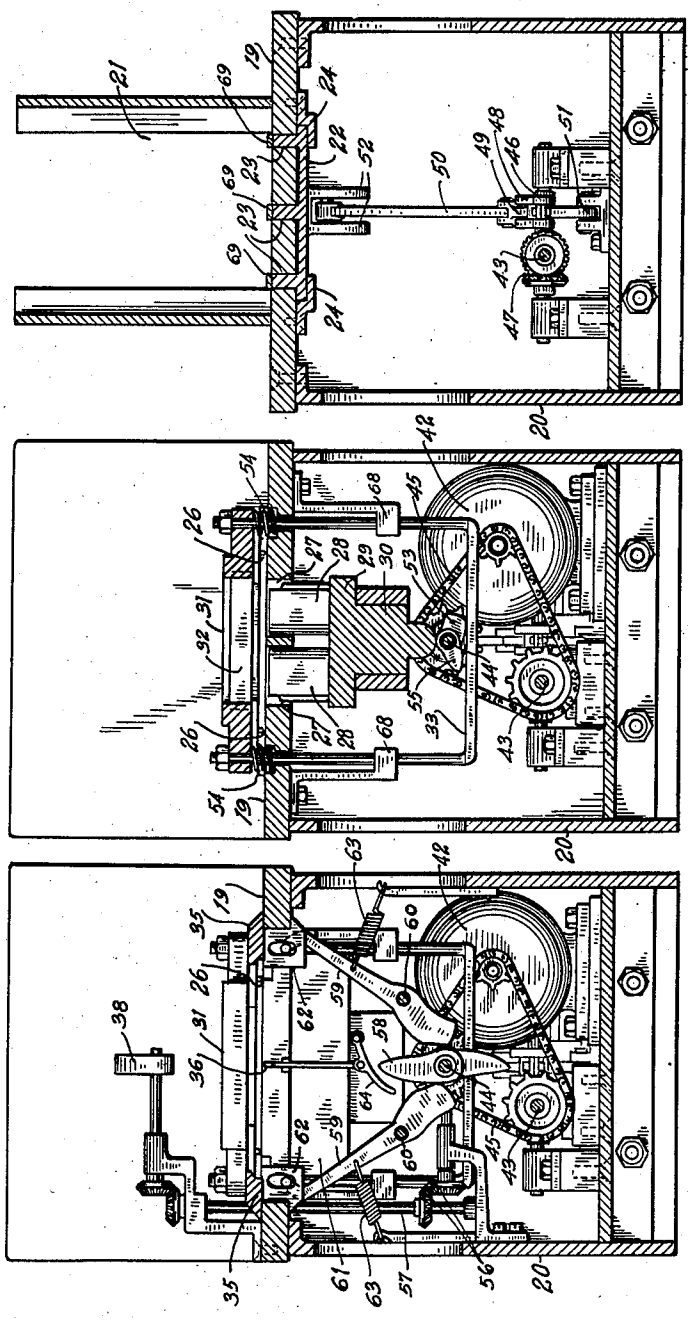


FIG. 4.

FIG. 6.

FIG. 5.

INVENTOR.
IRVING A. DELINE.

BY

ATTORNEY.

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BOX PARTITION MACHINE

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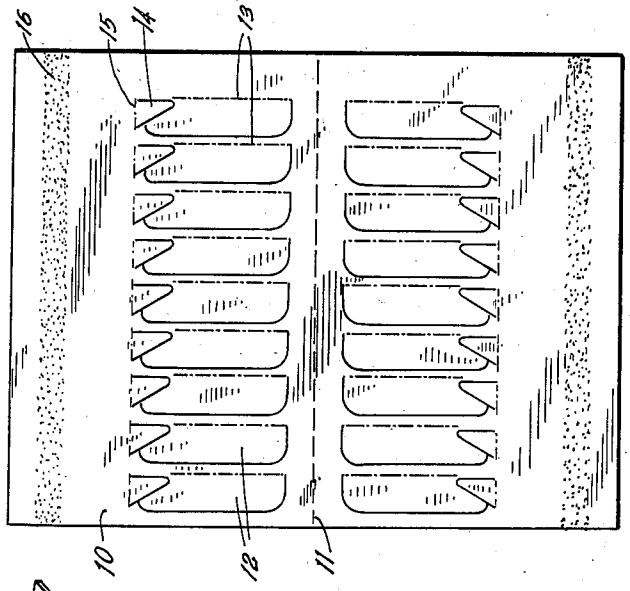


FIG. 8.

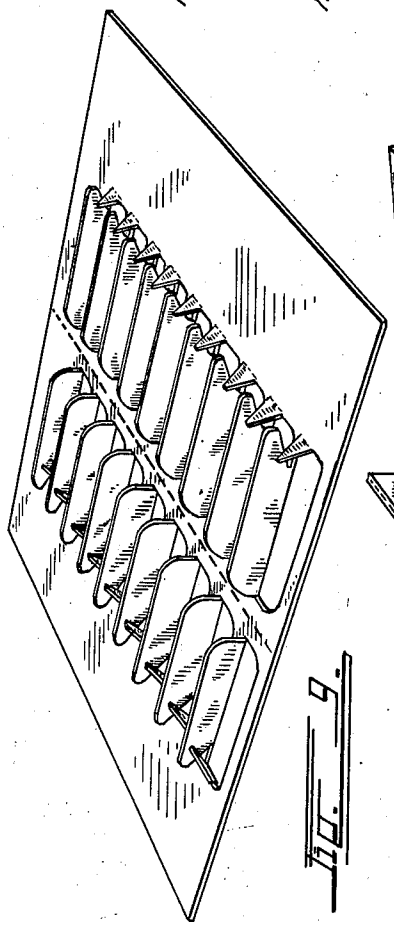


FIG. 9.

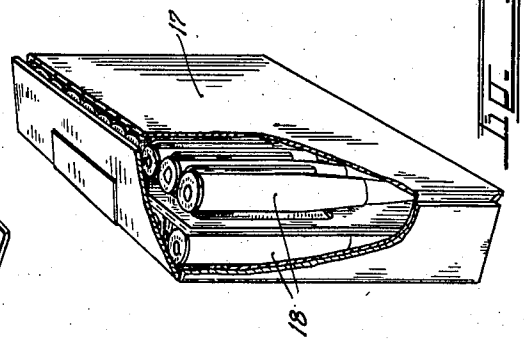


FIG. 11.

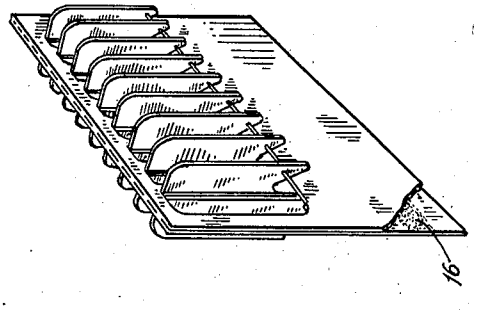


FIG. 10.

INVENTOR.
IRVING A. DELINE.
BY
ATTORNEY.

Patented Dec. 28, 1943 2,337,803

UNITED STATES PATENT OFFICE

2,337,803

BOX PARTITION MACHINE

Irving A. Deline, Denver, Colo.

Application February 7, 1942, Serial No. 429,892

8 Claims. (Cl. 93—37)

This invention relates to a machine for manufacturing cardboard box partitions and more particularly to a machine for manufacturing cartridge box partitions, such as illustrated in applicant's copending application, Serial No. 404,490.

The principal object of the invention is to provide an automatic machine into which a continuous stream of flat cardboard blanks may be fed and from which a continuous stream of completely erected partitions will discharge ready for insertion into a cartridge box or similar container.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:

Fig. 1 is a plan view of the improved machine;

Fig. 2 is an enlarged fragmentary plan view of the plunger portion of the machine with a blank in place therein;

Fig. 3 is a detail, perspective view of one of the plungers employed in the machine;

Fig. 4 is a longitudinal section through the complete machine, taken on the line 4—4, Fig. 1;

Figs. 5, 6, and 7 are cross sections, taken on the lines 5—5, 6—6, and 7—7, respectively, Fig. 1; and

Figs. 8, 9, 10, and 11 are detail views illustrating the successive steps in the formation of the improved partition member for cartridge boxes.

While this machine may be used for forming a plurality of different types of multiple partition sheets, it is more particularly designed for forming the blank of Fig. 8 into the partition member illustrated in Fig. 10. This partition member is formed from a cardboard blank 10 creased at 11 to fold across its middle in two equal parts, each part contains a plurality of flaps 12 which are cut from the sheet on three sides and creased for folding on the fourth side, as shown at 13, so that they will extend outwardly from the folded blank. A locking tongue 14 is cut from the blank opposite the extremity of each flap and is creased for folding on a fold line 15.

In the first operation of the improved machine, all of the flaps 12 are simultaneously forced upwardly from the sheet and the tongues 14 are then bent upward on an angle of approximately 45° to engage the flaps and hold them vertical, as shown in Fig. 9. In the second operation, the two halves of the sheet are folded flat against each other and secured together by means of a strip of glue 16, as illustrated in Fig. 10. The completed partition sheet is then slipped into a box, such as illustrated at 17, to form a plurality of compartments therein for receiving articles such as cartridges 18.

The improved machine comprises a table top 19 supported on a suitable frame 20. The table is provided with a vertical receiving hopper 21 in which the cardboard blanks 10 are piled. A plurality of cross heads 22 simultaneously reciprocate in slots 23 below the pile of blanks in the hopper 21. Each of the cross heads carries a projection 69 of slightly less thickness than the thickness of the cardboard in the blanks so that on each forward motion of the cross heads the bottom-most blank of the pile is pushed forwardly into the machine.

The blanks are received from the cross heads beneath two side plates 24 and a hold-down frame 25. Each of the side plates carries a friction spring 26 which engages the top surface of the blanks to prevent them from being thrown further forward than desired.

The next forward movement of the cross heads forces another blank from the bottom of the pile against the first blank so that the latter is forced forwardly a distance equal to the width of one blank. This places the first blank over a section of the table top which contains a plurality of openings 27 having a shape corresponding in number, position, and shape to the flaps 12 of the blank. A plunger 28 is positioned in each of these openings. The shape of the plungers conforms to the shape of the openings in the blank 10 which are formed by folding the flaps 12 and the tongues 14 upwardly. The plungers are mounted on a plunger base 29 which is carried on a suitable guide stem 30 so that they will all move upwardly in unison. The plunger base 29 is preferably inclined so that all of the plungers incline toward the feed extremity of the machine. This facilitates the folding of the flaps back over their hinge lines to bring them to a perpendicular position. The upper ends of the plungers are inclined downwardly toward the hinge lines of the blank so that the flaps will be first lifted at their free sides.

A clamping frame 31 is positioned above the plungers. The clamping frame carries a plurality of laterally extending, parallel blades 32 corresponding in position to the unfolded portions of the blank between the adjacent flaps 12. The clamping frame is mounted on a vertically reciprocating yoke member 33 which passes through suitable guides 68 supported from the table top 19.

In operation the clamping frame descends upon the blank clamping it securely over the openings 27 in the table top. The plungers 28 then ascend to simultaneously lift and fold all

of the flaps to a vertical position. Each plunger is provided with a depressed, inclined, triangular surface 34 positioned directly below the position of the locking tongue 14. Therefore, after the flaps 12 have been raised to the vertical position, the plungers continue to rise until the triangular depressed portions 34 strike the tongues 14 to bend them upwardly to the position illustrated in Fig. 9.

The plungers then withdraw from the blank and the clamping frame rises to release the folded blank. The cross heads now engage the next lowermost blank of the pile forcing it forwardly into the machine to push the preceding two blanks forwardly a distance equal to the individual width of a blank. This pushes the first blank, with the upwardly flooded flaps, between two laterally reciprocating press blocks 35 and over a vertically reciprocating finger 36. In passing to position between the press blocks 35, the blank rolls over a pair of gluing wheels 37 which apply the strips of glue 16 thereto.

The next movement of the machine forces the finger 36 upwardly so as to initially bend the blank upwardly along its medial fold line 11. The press blocks 35 are grooved where they engage the edges of the blank so that these edges cannot move upward with the movement of the finger 36. The two press blocks 35 now approach each other. In so doing they squeeze the two halves of the blank together, projecting the mid portion thereof upwardly. As soon as the two halves of the blank have been forced together, and while they are still held by the press blocks 35, a kicker 38 rotates against the rearward end of the folded blank to push it forwardly into a receiving slot 39 at the extremity of the table top. The slot 39 guides the partition member between two power-actuated press rolls 40. The rolls 40 force the folded partition member forwardly along a groove in a conveyor bar 41 to a position for insertion in the box 17.

Thus, it can be seen that each time the cross head 22 reciprocates forwardly, one completely folded box partition member is ejected from the machine. The various, above described, operating elements of the machine may be actuated in their proper sequence in any desired manner.

One method of operating the various elements is illustrated in the accompanying drawings, in which, the entire machine is driven from a suitable electric motor 42. The motor drives a rear countershaft 43 and a forward countershaft 44, through the medium of a suitable sprocket chain 45. The shafts 43 and 44 rotate in common direction and at the same speed.

The rear countershaft 43 drives a crank shaft 46 through the medium of suitable bevel gears 47. The crank shaft carries a crank 48 which is connected through the medium of a connecting rod 49 with a rocking lever 50. The lower extremity of the rocking lever is pivoted at 51 and the upper extremity engages slotted ears 52 on the cross heads 22. Thus, at each revolution of the shaft 46 the cross heads are forced forwardly and back through their complete stroke.

The forward countershaft 44 carries a first cam 53 which engages the yoke 33 of the clamping frame 31 so that, at each revolution of the shaft 44, the clamping frame will be pulled downwardly against the blank. Springs 54 elevate the clamping frame after each stroke. The countershaft 44 also carries a second cam 55 which, at each revolution of the shaft, engages a cam follower projection on the guide stem 30 to force the plunger 28 upwardly. The plungers may be returned by gravity or by any suitable springs, not shown.

A miter gear 56 is mounted on the shaft 44 to drive a vertical shaft 57 to actuate the kicker 38. The kicker rotates in unison with the countershaft 44 so as to force one of the folded partition members forwardly at each revolution of the countershaft 44. The shaft 44 also carries two, oppositely-facing, press block cams 58. The latter cams are positioned between the lower extremities of two inclined rocking levers 59 which are pivoted intermediate their extremities, as indicated at 60. One of the cams 58 is positioned in alignment with one of the levers 59, the other being in alignment with the opposed lever 59 so that at each complete revolution, both levers 59 are swung inwardly at their upper extremities. The upper extremities of the levers 59 engage in slotted openings formed in guide ears 62, one of which projects downward from each of the press blocks 35. The press blocks are returned to their original positions by means of suitable tension springs 63.

A hinged cam follower 64 is positioned in the path of one of the cams 58 and is connected to the finger 36, so that, before the press blocks close, the finger will move upwardly to start the initial bend in the blank. The finger then falls downwardly to allow the press blocks to squeeze the blank together. The shaft 44 also carries a bevel gear 65 which drives vertical shafts 66 which carry the press rolls 40.

It is believed that the operation will be understood from the above description. The shafts 43 and 44 are so timed that all operations of the cams on the shaft 44 take place during the return stroke of the rocking lever 50 when the blanks are stationary on the table. These cams all cease their operation during the forward movement of the rocking arm 59. The press rollers 40 and the kicker 38 operate continuously. The gluing wheels 37 ride against a glue feed roller 67 which is constantly immersed in suitable glue in a glue pot 61.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. A machine for forming cartridge box partitions from cardboard blanks of the type having a plurality of flaps cut from the blank on three sides and secured thereto on the fourth side comprising: a table top; a gang of plungers positioned below the blank on opposite sides of that axis of the blank in the direction of which the blank travels to be projected upwardly through said top; means for passing a blank over said plungers; means for clamping said blank against the table top over said plungers; means for forcing said plungers upwardly through said clamped blank to fold the plurality of partition flaps upwardly from said blank; and means for folding the backs of the two halves of said blank together so that the partition flaps of one half will project oppositely outward from the partition flaps on the other half.

2. A machine for forming cartridge box partitions from cardboard blanks having a plurality of partition flaps cut therein comprising: a table top; a plurality of plungers positioned to be pro-

jected upwardly through said top; means for passing a blank over said plungers; means for clamping said blank against the table top over said plungers; means for forcing said plungers upwardly through said clamped blank to fold the plurality of partition flaps upwardly from said blank; and a depressed surface on each plunger for forcing a locking tongue upward from said blank after the flaps have been folded upwardly therefrom to support the latter in their projecting position.

3. A machine for forming cartridge box partitions from cardboard blanks having a plurality of partition flaps cut therein comprising: a table top; a gang of plungers positioned below the blank on opposite sides of that axis of the blank in the direction of which the blank travels to be projected upwardly through said top; means for passing a blank over said plungers; means for clamping said blank against the table top over said plungers; means for forcing said plungers upwardly through said clamped blank to fold the plurality of partition flaps upwardly from said blank; means for withdrawing said plungers and said clamping means from said blank; and means engaging the opposite edges of said blank to force the mid-portion upwardly until the two halves thereof come together back to back so that the partition flaps of one half will project oppositely outward from the flaps of the other half.

4. A machine for forming box partition members from cardboard blanks having partition flaps cut therein comprising: a receiving hopper for holding a pile of said blanks; a cross head reciprocating beneath the pile of blanks in said hopper; means on said cross head for engaging the lowermost blank of said pile to force it along a table top; means on said top for guiding the blanks forced from said pile; a vertically reciprocating clamping frame for clamping the successive blanks to said table top; a gang of plungers positioned below the blank on opposite sides of that axis of the blank in the direction of which the blank travels reciprocating through said table top, through said blank and into said clamping frame for folding the partition flaps upwardly therein; and means for pressing the bottom faces of the two opposite halves of said blank together after it leaves said clamping frame so that the partition flaps of one half will extend oppositely outward from the partition flaps of the other half.

5. A machine for forming box partition members from cardboard blanks having partition flaps cut therein comprising: a receiving hopper for holding a pile of said blanks; a cross head reciprocating beneath the pile of blanks in said hopper; means on said cross head for engaging the lowermost blank of said pile to force it along a table top; means on said top for guiding the blanks forced from said pile; a vertically reciprocating clamping frame for clamping the successive blanks to said table top; a series of plungers reciprocating through said table top, through said blank and into said clamping frame for folding the partition flaps upwardly therein; a pair of opposed press members between which the blank is received after leaving said clamping frame; and means for forcing said pressing members against the opposite edges of said blank to bend the latter upwardly at its middle with its two halves together.

6. A machine for forming box partition members from cardboard blanks having partition flaps cut therein comprising: a receiving hopper for holding a pile of said blanks; a cross head reciprocating beneath the pile of blanks in said hopper; means on said cross head for engaging the lowermost blank of said pile to force it along a table top; means on said top for guiding the blanks forced from said pile; a vertically reciprocating clamping frame for clamping the successive blanks to said table top; a series of plungers reciprocating through said table top, through said blank and into said clamping frame for folding the partition flaps upwardly therein; a pair of opposed press members between which the blank is received after leaving said clamping frame; said pressing members being grooved to receive the opposite edges of said blank; means for forcing the mid-portion of said blank upwardly between said press members; and means for causing the two pressing members to approach each other to fold the two halves of the blank together.

7. A machine for forming box partition members from cardboard blanks having partition flaps cut therein comprising: a receiving hopper for holding a pile of said blanks; a cross head reciprocating beneath the pile of blanks in said hopper; means on said cross head for engaging the lowermost blank of said pile to force it along a table top; means on said top for guiding the blanks forced from said pile; a vertically reciprocating clamping frame for clamping the successive blanks to said table top; a gang of plungers positioned below the blank on opposite sides of that axis of the blank in the direction of which the blank travels reciprocating through said table top, through said blank and into said clamping frame for folding the partition flaps upwardly therein; means for folding the bottom faces of the two opposite halves of said blank together after it leaves said clamping frame so that the partition flaps of one half will extend oppositely outward from the partition flaps of the other half; a conveyor slot for receiving the folded blank; and means for forcing the folded blank from between said press members into said slot.

8. A machine for forming box partition members from cardboard blanks having partition flaps cut therein comprising: a receiving hopper for holding a pile of said blanks; a cross head reciprocating beneath the pile of blanks in said hopper; means on said cross head for engaging the lowermost blank of said pile to force it along a table top; means on said top for guiding the blanks forced from said pile; a vertically reciprocating clamping frame for clamping the successive blanks to said table top; a gang of plungers positioned below the blank on opposite sides of that axis of the blank in the direction of which the blank travels reciprocating through said table top, through said blank and into said clamping frame for folding the partition flaps upwardly therein; means for pressing the middle of said blank upwardly to bring the backs of the two halves of said blank together after it leaves said clamping frame so that the partition flaps will extend outward from the opposite faces thereof; and means for applying adhesive to the adjacent faces of the two halves before folding to secure them together.

IRVING A. DELINE.